

CLAIMS

1. A method for manufacturing a universal joint yoke, comprising a forging step for forming a universal joint yoke preform from a workpiece placed in a die comprising an upper die 103 and a lower die 65, which are to define a closed space, the forging step being performed such that while a back pressure not lower than  $0.5 \text{ kg/mm}^2$  is applied to an end of a prospective universal joint yoke cup portion of the workpiece via a ring knock 67, material of the workpiece is allowed to flow into a pin-boss-forming cavity of the lower die adapted to form a pin boss portion extending opposite the prospective cup portion until a filling rate not lower than 75% is reached, and that the ring knock is then moved in a direction opposite a regular forming direction of the upper or lower die, in which the ring knock is disposed, so as to initiate flow of the workpiece material toward the prospective cup portion.
2. The manufacturing method according to claim 1, wherein the back pressure increases as the ring knock moves in the opposite direction, and a final back pressure is 1.2 to 2.2 times an initial back pressure.
3. The manufacturing method according to claim 1 or 2, wherein the back pressure is generated by means of a gas cushion or spring.
4. The manufacturing method according any one of claims 1 to 3, wherein a back pressure of  $1.5$  to  $25 \text{ kg/mm}^2$  is initially applied, and then, while the back pressure is held

at a value of 0.5 to 20 kg/mm<sup>2</sup> that is lower than the initially applied value, the workpiece material is allowed to flow into the pin-boss-forming cavity until a filling rate not lower than 90% is reached, followed by movement of the ring knock.

5. The manufacturing method according to any one of claims 1 to 4, wherein the back pressure is generated by means of a hydraulic cushion.

6. The manufacturing method according to claim 1, wherein the back pressure is generated by at least two means selected from gas cushion, spring and hydraulic cushion.

7. The manufacturing method according to any one of claims 1 to 6, wherein the workpiece is of an aluminum alloy selected from among A6061, A6082, A2014, A2017, A4032 and A7075.

8. The manufacturing method according to any one of claims 1 to 7, wherein the workpiece is formed by the steps of cutting a round bar of an aluminum alloy into pieces each having a predetermined length and upsetting each of the pieces, and further comprising the steps of heat-treating an as-forged article and machining the heat-treated article.

9. The manufacturing method according to claim 8, wherein the machining step to be performed after the forging step does not involve a step of trimming a parting-line flash of the as-forged article.

10. A forging die for use in forging a universal joint yoke preform, comprising an upper die 103 and a lower die 65 which

are to define a closed space, a ring knock 67, a knockout pin 64, a die holder, back pressure generation means for generating a back pressure not lower than  $0.5 \text{ kg/mm}^2$  to be applied to the ring knock, and a pressure-bearing plate on which the upper or lower die and the back pressure generation means are disposed.

11. The forging die according to claim 10, wherein the back pressure generation means comprises at least one of a gas cushion and a hydraulic cushion.

12. A universal joint yoke preform manufactured by the manufacturing method according to any one of claims 1 to 9, wherein a height variation of the prospective cup portion 41 is not greater than 8 mm.

13. A universal joint yoke having a cup portion, a pin boss portion and a parting-line portion that bears no trimming mark, and exhibiting a ratio of a crystal grain average length as measured at (41b) to a crystal grain average length as measured at (41a), which ratio is 0.5 to 1.5, wherein the (41a) is an end region of the cup portion, opposite to which no pin boss portion exists, and the (41b) is an end region of the cup portion, opposite to which the pin boss portion exists.

14. The universal joint yoke according to claim 13 that is produced using the universal joint yoke perform of claim 12.